

RAPPORTEUR'S SUMMARY

FIRST NORTHEAST FISHERIES CENTER STOCK ASSESSMENT WORKSHOP

8-12 JULY, 1985

FALMOUTH, MASSACHUSETTS

SPONSORED BY.

CONSERVATION AND UTILIZATION DIVISION

NORTHEAST FISHERIES CENTER

NATIONAL MARINE FISHERIES SERVICE

VAUGHN C. ANTHONY (DIVISION CHIEF)

STEVEN A. MURAWSKI (RAPPORTEUR)

EXECUTIVE SUMMARY

During 8-12 July 1985 a workshop on assessment of Northeast marine fisheries resources was conducted in Falmouth, Massachusetts. The workshop was sponsored by the Conservation and Utilization Division of the Northeast Fisheries Center.

The 64 workshop participants represented seven state marine fisheries agencies (Virginia, Maryland, Delaware, New Jersey, New York, Connecticut, and Massachusetts), as well as the Mid-Atlantic and New England Fishery Management Councils, the Northeast Regional Office of NMFS, and the Northeast Fisheries Center.

Goals of the meeting included, (1) identification of data requirements for assessment and the adequacy of current assessments, given present and projected management needs, (2) specification of approaches to enhance cooperation among states and the federal government in upgrading assessments of mutual interest and in the expeditious delivery of these assessments to appropriate management bodies, (3) prioritization of future assessment activities based on projected management concerns, and (4) assignment of lead assessment responsibilities for all species based on state versus federal expertise and/or jurisdiction.

Assessment reviews were presented for 33 species/groups monitored at NEFC. These reviews identified both current data bases and analytical techniques as well as important future research needs for improved assessments. An overview of current generic sampling programs conducted by NEFC and NMFS (i.e. commercial landings sampling, biostatistics, resource surveys, sea sampling, population biology, and recreational catch sampling) was also presented.

Lists of both species specific research needs, and generic assessment issues were compiled, based on various comments presented at the workshop. These items may be useful as 'terms of reference' for future assessment investigations. Species assessment priorities were identified as high, medium, or low based on the current and anticipated needs of Federal Fishery Management Councils, and other agencies (e.g. Atlantic States Marine Fisheries Commission, ASMFC). Thus, for example, bluefish, yellowtail flounder, and northern shrimp were designated high priority assessments, lobster, sea scallop and tilefish were accorded medium priority, while spiny dogfish, white hake and Atlantic herring were classified as low priority.

The group considered appropriate forums for conducting various assessments, based on state/federal interests and jurisdictions. Species of primarily Federal interest may be assessed in semiannual NEFC workshops. A proposal was outlined to conduct a series of concurrent assessment working groups, for

species of major concern to the states, just prior to the ASMFC annual meeting. Species that could potentially be assessed in such a format include: northern shrimp, Atlantic herring, striped bass, black sea bass, bluefish, sciaenids, river herrings (including shad), summer flounder, and winter flounder.

RATIONALE

A workshop on the assessment of marine fisheries resources off the northeast coast of the United States was held in Falmouth, Massachusetts, during 8-12 July 1985. Sponsored by the Conservation and Utilization Division of the Northeast Fisheries Center (NEFC, NMFS), the workshop was designed to address several specific goals and to generate discussion on how and under what circumstances future workshops should be conducted. The intent of the meeting was to draw together a cross-section of working marine fisheries assessment scientists from state and federal agencies, as well as representatives from various management bodies such as the Regional Fishery Management Councils (the 'customers' served by the products of stock assessment research). The purpose of the meeting was not specifically to present current assessments of selected stocks, but rather to discuss the adequacy of assessments in general, and what steps might be taken to improve the quality and timeliness of assessments, while reducing duplication of efforts and encouraging cooperation among state and/or federal scientists.

Few synoptic assessments of most migratory species exist due to the difficulty experienced in integrating individual state's assessment data and analyses into overall analytical evaluations. These efforts have also been confounded by both the spatial and temporal variation of the fish populations, and the fisheries

that exploit them. Thus, for example, overall assessments of bluefish fishing mortality at age require data on gear selectivity and fishing effort variations by area and season.

Stock assessment studies have been a primary focus of federal marine fisheries research in the northeast for a considerable time. However, these efforts have rarely effectively integrated the scientific expertise among various state marine fisheries agencies.

Analogous problems of coordination of interjurisdictional fisheries interests in stock assessments exist within other intranational and international fisheries arenas. Several fisheries commissions have addressed the multi-jurisdictional assessment problem by establishing 'working group' forums wherein various scientists concerned with a species or species group meet and conduct joint evaluations. In particular, examples of such working groups are found within the International Council for the Exploration of the Sea (ICES), and the Canadian Atlantic Fisheries Scientific Advisory Committee (CAFSAC).

Since the U.S. withdrawal from the International Commission for the Northwest Atlantic Fisheries (ICNAF), a recurring problem has been the lack of outside peer review of federal assessment documents prepared for fishery management bodies. One potential solution to this problem would be to establish domestic working groups to conduct specific assessments, inviting appropriate outside scientists with expertise in population dynamics and interest in the species considered. This was one of the primary

reasons for organizing the first NEFC stock assessment workshop. Another reason was to organize and prioritize assessments to insure their adequacy and timeliness, and enhance data collection efficiency and data analyses.

With these explicit and implicit objectives in mind, representatives from all northeast state marine fisheries agencies, as well from the Mid-Atlantic and New England Fisheries Management Councils, and the Northeast Regional Office of NMFS were invited to participate in the workshop.

OVERVIEW

The workshop was attended by a total of 64 individuals representing seven of the ten northeast state marine fisheries agencies, the Mid-Atlantic and New England Fisheries Management Councils, the Northeast Regional Office of NMFS, and the NEFC. A complete attendance list is given in Table 1 attached to this report. A detailed agenda of the workshop is presented in Appendix I. Dr. Vaughn Anthony, Chief of the Conservation and Utilization Division of NEFC served as chair; Dr. Steven Murawski was selected rapporteur.

After a brief introductory statement of goals of the workshop, several descriptions of generic fisheries sampling programs conducted by NEFC and NMFS were presented. These overviews considered the collection of fishery statistical and biostatistical data, sea sampling programs, synoptic NEFC

resource surveys, population biology studies (e.g. age and growth monitoring), and recreational fisheries statistics programs.

Following these presentations, various NEFC staff described assessment research conducted on 33 species/groups. These presentations focused primarily on methodologies and data used in the assessments, and unaddressed problem areas. Workshop participants discussed each assessment and developed concise biological terms of reference to be addressed (Appendix II). During these species overviews several issues returned of generic concern to almost all assessments. These general issues were noted and compiled for detailed discussion during the last day of the workshop (Appendix III).

The assessment reviews prompted discussion which identified important areas for additional research. It is hoped that these terms of reference will be considered in future stock evaluations and/or guide the direction of assessment research and monitoring programs at both the federal and state level.

Subsequent to the assessment reviews, the workshop participants evaluated the importance (priority) to be accorded to each assessment, as perceived at that time. The issue of priorities is a difficult one since there are both management and scientific priorities. Nonetheless, each of the 33 species/groups was assigned a numerical priority rating corresponding to high, medium, or low. These rankings are included in Table 2, and tentatively will be used by NEFC to organize assessment research during the upcoming year.

Considerable discussion was generated as to the appropriate forums under which assessments of the various species of the region could best be conducted. One suggestion, generally accepted, was to institute semiannual NEFC stock assessment workshops (spring and autumn) during which certain assessments will be conducted, reviewed, and distributed (Table 3). Selection of either the spring or autumn workshop for a particular stock was based on schedules of council activities and the availability of required data within the year. It was noted that most of the species of the region are of joint state/federal interest and jurisdiction. The consensus of the workshop participants was that assessments of stocks primarily confined to state waters could benefit from another working group meeting. Group assessments of stocks of concern to the states could be conducted in a more synoptic framework than many current individual state efforts. Species boards, like those under ASMFC may serve as forums for joint state assessments.

Obviously, some species of major interest to the states are currently assessed in essentially a working group format (e.g. northern shrimp and sciaenids). An expanded list of species assessments that would potentially benefit from such a format was compiled by the workshop, including:

- Atlantic Herring
- Striped Bass
- Black Sea Bass
- Bluefish

Sciaenids

River Herrings (including shad)

Summer Flounder

Winter Flounder (inshore populations)

The potential sponsorship of such working groups was debated at length by workshop participants. One proposal which generated considerable discussion was to conduct assessment working groups (for all or a portion of the above species) during the week prior to the annual ASMFC meeting. Such a format has several advantages over the current ASMFC species board meeting schedules. One advantage of holding concurrent and/or consecutive species working groups is that individual research scientists in particular states who may be responsible for more than one of the species may have to prepare for and travel to only one meeting rather than several. The primary advantage of such a forum, however, is likely to be the increased expertise that will be available to help analyze both generic and specific assessment problems. By encouraging both experts on particular species, and individuals with primarily analytical skills to attend such meetings, the quality of assessments is likely to increase markedly.

The workshop consensus was that a summary of this proposal should be presented to the state directors for their consideration at the October 1985 ASMFC meeting.

Scientific output from these workshops will be a revised and expanded status of stocks report ("Status of the Fishery

Resources off the Northeastern United States for 1983", NOAA Technical Memorandum NMFS-FNEC-29), addressing particular terms of reference from managers. These status of stocks reports will replace individual species assessment documents now generated by NEFC. Thus, the users of these analyses will be able to anticipate the availability of a written status document shortly after these workshops, and plan accordingly. This approach should allow scientists more time to address the specific issues identified in Appendices I and II, since the practice of producing ad hoc assessment updates would be greatly curtailed.

The workshop participants next considered additional species to be routinely assessed by NEFC. These species are listed in Appendix III under general assessment issues. The list includes species primarily under both federal and state jurisdiction, and some that are of more ecological than direct management significance.

In its final discussions, the Workshop addressed the list of generic issues compiled during individual assessment presentations (Appendix III). These issues include the adequacy of various standardized data bases and sampling protocols, and the need for increased research on stock identification studies (this was a particular emphasis of several state scientists), as well as the appropriateness of more directed research on stock-recruitment relationships (many stocks seem to be currently exhibiting signs of recruitment overfishing). Several workshop participants felt that the generic issues would receive greater

emphasis if cooperative state/state and state/federal approaches to marine fisheries research in the region were sought and established.

Table 1. List of participants.

| Name | | Organization |
|-----------------|-------------|--|
| Almeida | Frank | Northeast Fisheries Center |
| Anthony | Vaughn C. | Northeast Fisheries Center |
| Asarovitz | Thomas R. | Northeast Fisheries Center |
| Boraman | John | Northeast Fisheries Center |
| Bowman | Ed | Northeast Fisheries Center |
| Brady | Phil | Massachusetts Division of Marine Fisheries |
| Burnett | Jay | Northeast Fisheries Center |
| Burns | Thurston S. | Northeast Fisheries Center |
| Busch | Donna | Northeast Fisheries Center |
| Byrne | Charles | Northeast Fisheries Center |
| Chittenden | Mark E. | Virginia Institute of Marine Science |
| Clark | Stephen | Northeast Fisheries Center |
| Crecco | Vic | Connecticut Department of Environmental Protection |
| Currier | Tom | Massachusetts Division of Marine Fisheries |
| Dery | Louise | Northeast Fisheries Center |
| Despres-Patanjo | L. | Northeast Fisheries Center |
| DiCarlo | Joseph S. | Massachusetts Division of Marine Fisheries |
| Diodati | Paul | Massachusetts Division of Marine Fisheries |
| Doll | Jack | Northeast Fisheries Center |
| Estrella | Bruce | Massachusetts Division of Marine Fisheries |
| Flescher | Donald D. | Northeast Fisheries Center |
| Fogarty | Michael | Northeast Fisheries Center |
| Forrester | Janice P.S. | Northeast Fisheries Center |
| Gabriel | Wendy L. | Northeast Fisheries Center |
| Gallagher | Art | Northeast Fisheries Center |
| Goodale | Hannah | Northeast Fisheries Center |
| Grace | Melinda | Northeast Fisheries Center |
| Himchak | Peter | New Jersey Department of Marine Fisheries |
| Hove | Arnold | Massachusetts Division of Marine Fisheries |
| Idoine | J.S. | Northeast Fisheries Center |
| Jearld | Ambrose | Northeast Fisheries Center |
| Keifer | David | Mid-Atlantic Fishery Management Council |
| Kirkley | Jim | Northeast Fisheries Center |
| Lange | Anne | Northeast Fisheries Center |
| Lewis | Rhett | Northeast Fisheries Center |
| Logan | Phil | Northeast Fisheries Center |
| Marchesseault | Guy | New England Fishery Management Council |
| Mason | John M. | New York Division of Marine Resources |
| Mayo | Ralph K. | Northeast Fisheries Center |
| McBride | Margret | Northeast Fisheries Center |
| Murawski | Steven A. | Northeast Fisheries Center |
| O'Brien | Loretta | Northeast Fisheries Center |
| Overholtz | Bill | Northeast Fisheries Center |
| Palmer | Joan | Northeast Fisheries Center |
| Penttila | Judy | Northeast Fisheries Center |
| Peterson, Jr. | Allan E. | Northeast Fisheries Center |
| Pierce | David | Massachusetts Division of Marine Fisheries |
| Rehfus | Ruth | Northeast Region NMFS |
| Richards | Anne | Northeast Fisheries Center |
| Ropes | John W. | Northeast Fisheries Center |
| Ruais | Rich | New England Fishery Management Council |
| Rugolo | Louis J. | Maryland Department of Natural Resources |
| Russel, Jr. | Howard D. | New England Fishery Management Council |
| Rutledge | Monique | Northeast Region NMFS |
| Schultz | Ron | Northeast Fisheries Center |
| Seagraves | Rich | Delaware Division of Fisheries and Wildlife |
| Serchuk | Fred | Northeast Fisheries Center |
| Shepherd | Gary | Northeast Fisheries Center |
| Shepherd | Susan | Northeast Fisheries Center |
| Silverman | Malcolm | Northeast Fisheries Center |
| Sisenvine | Michael | Northeast Fisheries Center |
| Smolowitz | Ronald J. | Northeast Region NMFS |
| Varing | Gordon | Northeast Fisheries Center |
| Wigley | Susan | Northeast Fisheries Center |

Table 2. Proposed assessment priorities by species.

| Species | Priority Ranking (1) |
|------------------|----------------------|
| Summer Flounder | 2 |
| Yellowtail | |
| Flounder | 1 |
| Winter Flounder | |
| (Georges Bank) | 1 |
| (inshore) | 1 |
| American Plaice | 2 |
| Witch Flounder | 2 |
| Atlantic Cod | 1 |
| Spiny Dogfish | 3 |
| Pollock | 2 |
| Silver Hake | 1 |
| Red Hake | 3 |
| White Hake | 3 |
| Redfish | 2 |
| Haddock | 2 |
| Cusk | 3 |
| Wolffish | 3 |
| Ocean Pout | 3 |
| Tilefish | 2 |
| Skates | 3 |
| Black Sea Bass | 2 |
| Shad - River | |
| Herring | 1 |
| Striped Bass | 1 |
| Bluefish | 1 |
| Scup | 3 |
| Ocean Quahog | 3 |
| Atlantic | |
| Mackerel | 1 |
| Atlantic | |
| Herring | 3 |
| Butterfish | 1 |
| Loligo Squid | 1 |
| Illex Squid | 1 |
| American Lobster | |
| (offshore) | 2 |
| Red Crab | 2 |
| Northern Shrimp | 1 |
| Surf Clam | |
| (offshore) | 2 |
| Sea Scallop | 2 |

(1)

High = 1, Medium = 2, Low = 3

Table 3. Proposed agendas for semi-annual NEFC assessment meetings.

| Species | Spring Meeting (April) | Autumn Meeting (September) |
|--------------------------------|---------------------------|-------------------------------|
| Sea Scallop | X | |
| Haddock | X | |
| Redfish | X | |
| White Hake | X | |
| Butterfish | X | |
| Loligo Squid | X | |
| Illex Squid | X | |
| Witch Flounder | X | |
| Yellowtail Flounder | X | |
| American Plaice | X | |
| Silver Hake | X | |
| Red Hake | X | |
| Atlantic Mackerel | | X |
| American Lobster (offshore) | | X |
| Winter Flounder | | X |
| Surf Clams | | X |
| Ocean Quahog | | X |
| Atlantic Cod | | X |
| Spiny Dogfish | | X |
| Skates | | X |
| Tilefish | | X |
| Pollock | | X |
| Cusk | | X |
| Wolffish | | X |
| Red Crab | | X |

APPENDIX I

AGENDA - FIRST NEFC STOCK ASSESSMENT WORKSHOP

8-12 July
Falmouth School Administration Building
Falmouth Massachusetts

Monday 8 July

INTRODUCTORY REMARKS

9:00 - 10:00

Welcome, Introductions.
Selection of Rapporteur,
Distribution of Documents,
Overview of Meeting Goals and Format

SESSION 1 -- RESEARCH OVERVIEWS

10:00 - 12:00

Port Statistics - Ronnee Schultz
Port Sampling - Thurston Burns
Biostatistics - Joan Palmer
Research Surveys - Tom Azarovitz, Chuck Byrne
Sea Sampling - Thurston Burns
Population Biology - Judy Penttila
Recreational Surveys - John Boreman

SESSION 2 -- DEMERSAL FISHES (FLOUNDERS)

1:30 - 4:30

Summer Flounder - Anne Lange
Yellowtail Flounder - Steve Clark
Winter Flounder - Wendy Gabriel
American Plaice - Fred Serchuk
Witch Flounder - Jay Burnett

Tuesday 9 July

SESSION 3 -- DEMERSAL FISHES (CONTINUED)
9:00 - 12:00

Atlantic Cod - Fred Serchuk
Spiny Dogfish - Gordon Waring
Pollock - Ralph Mayo
Silver Hake - Frank Almeida
Red Hake - Frank Almeida
White Hake - Steve Clark

SESSION 4 -- DEMERSAL FISHES (CONTINUED)
1:30 - 5:00

Redfish - Ralph Mayo
Haddock - Bill Overholtz
Cusk - Steve Clark
Wolffish - Steve Clark
Ocean Pout - Jay Burnett
Skates - Gordon Waring
Tilefish - Steve Murawski

Wednesday 10 July

SESSION 5 -- COASTAL/ANADROMOUS
9:00 - 12:00

Black Sea Bass - Rhett Lewis
Atlantic Salmon - Vaughn Anthony
River Herring/Shad - Gary Shepherd
Striped Bass - John Boreman
Bluefish - Rhett Lewis

SESSION 6 -- PELAGIC RESOURCES
1:30 - 5:00

Scup - Ralph Mayo
Ocean Quahog - Steve Murawski
Atlantic Mackerel - Bill Overholtz
Butterfish - Gordon Waring
Loligo Squid - Anne Lange

Thursday 11 July

SESSION 7 -- INVERTEBRATES

9:00 - 12:00

Illex Squid - Anne Lange
American Lobster - Mike Fogarty
Northern Shrimp - Steve Clark
Surf Clam - Steve Murawski
Sea Scallop - Fred Serchuk

SESSION 8 -- ADEQUACY OF ASSESSMENTS

1:30 - 4:30

Terms of Reference by Species
Importance (Priority) of Each Assessment

Friday 12 July

SESSION 9 -- GENERAL SESSION

9:00 - 12:00

Alternative Assessment Forums - Allen Peterson, Jr.
Timing of Assessments
State/Federal Cooperation in Assessments
Other Assessments
Generic Assessment Issues

APPENDIX II

LIST OF IMPORTANT ASSESSMENT ISSUES (TERMS OF REFERENCE) BY SPECIES

Summer Flounder

- * Current recruitment estimators are not adequate for fishery projections
- * Inter-annual variability in ratios of commercial and recreational catches is high perhaps due to poor recreational catch estimates
- * Much of the species expertise lies with biologists in the various states thus a synoptic state/federal approach to summer flounder assessment seems most appropriate
- * Further work on stock identification for the species is required

Yellowtail Flounder

- * Lack of estimates of the age composition of discards appears to be the major impediment to conducting an analytical assessment (i.e., VPA)
- * Further evaluation of growth and natural mortality rates is needed
- * VPA analyses are required both for stock assessment and ecological research on the species
- * Research on the stock-recruitment relationship is necessary for defining spawning stock biomass per recruit targets for fishery management
- * Further research is needed on fishing power changes in the fleet during recent years

Winter Flounder

- * Age validation and ageing methodology need to be addresses before any cohort based assessment calculations can be made
- * State/Federal approach to assessing this species is desirable since a large portion of catch is from estuaries and near shore areas
- * Estimates of fishing power coefficients and research on CPUE from the mixed-species fishery are necessary
- * Sampling of landings from some areas (e.g. Gulf of Maine) needs improvement

American Plaice

- * Stock structure is currently unresolved
- * Reliable recruitment indices need to be developed
- * Ageing data need to be integrated for correlating observed trends in research vessel survey indices
- * Quantitative estimates of Z are generally lacking
- * Further analyses of catch by market category will be undertaken
- * Shifts of large tonnage class vessels to plaice may explain changes in the areal distribution of landings

Witch Flounder

- * Problems of mixed-species effort confounds CPUE analyses for this species
- * Discards of young witch should be examined more fully in the redfish and northern shrimp fisheries
- * Estimates of Z are lacking
- * Valid recruitment estimators have not been developed
- * Ageing past c.a. 9 years is unreliable with scales, but ages 3-9 account for about 90% of landings. Ageing techniques need to be finalized and validated
- * Evaluation of growth and mortality rates (natural, fishing, total) needs to be completed
- * Studies of distribution by size and age may help to elucidate the recruitment mechanisms for this species
- * Recent shifts of large vessel effort to witch may be due to a number of factors including displacement from traditional grounds, and decreases in abundance of other species

Atlantic Cod

- * Modifications to recreational survey are necessary to accurately estimate catch in weight and numbers and mean fish weights
- * There are apparent discrepancies between U.S. and Canadian ageing for the Georges Bank stock that should be resolved
- * Analyses of F versus f might be useful in VPA tuning
- * Cooperative analyses of recent Canadian cod tagging data may help to

resolve the degree of stock inter-mixing

- * Areal shifts in landings and CPUE by vessel class should be evaluated
- * Completion of an analytical assessment will allow for evaluation of the appropriate relative spawning stock biomass per recruit level as a target for fishery management
- * Managers would like to compare Canadian and U.S. management systems (i.e. mesh and areal closures vs. catch quotas) for the Georges Bank stock

Spiny Dogfish

- * By-catch and resulting discard mortality could be an important source of mortality on the species that is not accounted for by landings statistics
- * CPUE analyses cannot be performed for the directed fishery due to confidentiality of one company data
- * Differences in spiny dogfish growth rates among several recent studies need to be resolved
- * Considerable variability in survey abundance indices leads to imprecise total biomass estimates from the swept area method
- * Predator/prey relationships of dogfish and other species likely to be important
- * What is the optimum utilization rate for the stock given the low mean fertility, natural mortality rate, and long life span?

Pollock

- * Use of Massachusetts inshore survey data to monitor recruitment looks promising (cooperative analyses?)
- * Small mesh fisheries may be generating mortalities on juveniles
- * Stock structure is currently unresolved, possibility of Gulf of Maine stock distinct from Scotian Shelf
- * Updated effort and CPUE analyses incorporating fishing power changes and gill net catches are necessary

Silver Hake

- * Re-analysis of VPA incorporating new stock definitions is currently underway
- * By-catch and discard of young silver hake in the shrimp fishery is

a potential source of significant juvenile mortality

- * CPUE indices for southern and northern stocks need to be re-constructed with different standard fleets
- * Consistency of surveys and analytical assessments for tracking cohorts will be examined
- * Predatory impact of silver hake is likely significant

Red Hake

- * Updated VPA based on new stock boundaries will be undertaken
- * A re-analysis of growth rate data is required
- * Predator/prey considerations for red hake are important
- * CPUE indices need to be re-calculated given new stock boundaries

White Hake

- * Ageing and age validation studies are needed
- * Stock identification studies are needed
- * Growth and mortality rates should be determined
- * Additional work is required to determine size composition of landings

Redfish

- * CPUE analyses for recent years is confounded by the decline in directed trips (50% trips now account for 30% of landings while pre-1978 they accounted for 80-90%)
- * Evaluation of 1960's catch at age (for VPA) would allow analysis of the frequency of good cohorts in the past (based on archived otolith data)
- * Refined growth curves (mean weights at age) are necessary

Haddock

- * Further research on stock delineation and mixtures could be useful
- * Effort-CPUE analyses are increasingly difficult because of mixed species trawl effort problem
- * Determination of terminal F's is imprecise at low stock sizes

- * Retrospective analyses of the effectiveness of present closed areas in relation to changes in F would be helpful to managers
- * What is the proper mix of stock assessment vs. ecological (multi-species) research concerning haddock, given the current status of the stocks?
- * An updated maturity ogive is necessary for spawning stock calculations

Cusk

- * Biological studies are needed to provide baseline data for single and multispecies assessment needs

Atlantic Wolffish

- * Comments same as for cusk

Ocean Pout

- * Interest was expressed by State of Massachusetts since their survey overlaps the Cape Cod Bay fishery for the species
- * Knowledge of the basic biology of the species is relatively good
- * Local changes in abundance may be important relative to fisheries of limited geographic scale
- * NMFS survey seems to track abundance rather well

Skates

- * Species composition of landed "wings" is unknown
- * By-catch and discard mortality for skates is unknown
- * Probably very limited annual productivity from the stocks based on low population fertility rates

Tilefish

- * Analytical assessment currently being completed as part of Rutgers contract
- * Logbook program should be continued even though Rutgers no longer involved in this research

Black Sea Bass

- * By-catches with BSB should be evaluated more fully
- * Field criteria for sex determination should be developed
- * Abundance indices from trawl surveys may be unreliable since fish are generally distributed in abundance over untrawlable bottom
- * Artificial reef program by State of New Jersey may be a useful source of biological samples to monitor size/age composition of recreational catches
- * Ageing data need to be updated from studies by Mercer (studies are currently underway)
- * Some discrepancies in abundance trends between NEFC and State of Massachusetts trawl surveys exist. These need to be resolved.
- * More data on the basic biology of the species is required, including a better understanding of the sex reversal process, and spawning behavior

Shad - River Herring

- * By-catch of river herrings in offshore mackerel fisheries may generate high levels of mortality if mackerel landings increase. River herring by-catch data from NMFS observer samples should be worked-up.
- * In general, good CPUE series for river herrings are lacking
- * Abundance indices are generally poor
- * The relative contributions of habitat degradation and fishing to overall population declines are unknown
- * Stock-recruitment relations are good for some stocks (Connecticut River shad), but are generally poor for most

Striped Bass

- * Estimation of fishing mortality rates (through an analytical assessment) is the primary research priority
- * "Risk-analyses" utilizing recruitment probabilities is ongoing
- * Effects of pollution induced mortality vs. fishing need to be refined

Bluefish

- * Stock identification is unresolved

- * CPUE indices are lacking
- * Catch at age data do not exist
- * Natural mortality rate is not well defined
- * MSY calculations can be improved
- * An analytical assessment would be useful by incorporating the catches by diverse gear types, and differing selection patterns of these gears into an overall analysis of F's at age and abundance
- * Research should be upgraded on this species since it is likely to be less abundant in the future, given historical fluctuations in this species

Scup

- * Stock structure is unresolved
- * Effective effort calculations are needed for CPUE analyses for some fisheries
- * Additional research on the relationship of changes in availability on CPUE indices could be valuable
- * There is an historical lack of catch at age for Middle Atlantic fisheries, and no current ageing program for any area
- * Since many scup fisheries are in state waters, and inshore surveys catch them in abundance, state/federal cooperation in scup assessments seems appropriate

Ocean Quahog

- * Analytical assessment impossible due to unrealistic ageing requirements (100+ age groups in the populations)
- * Current status of knowledge is sufficient to support present management system for the next several years
- * Several year interval between resource surveys is sufficient to monitor abundance and recruitment

Atlantic Mackerel

- * Stock identification still not completely resolved (perhaps a tagging program would resolve the stock structure)
- * Predator/prey relations of mackerel likely important ecologically and in relation to other commercial species

- * Given the relatively low landings in relation to standing stock, an annual assessment may not be justified
- * Catches of marine mammals in joint venture mackerel fisheries may be a significant issue both as a source of mammal mortality and as an indicator of mammal predation on mackerel

Butterfish

- * Changes in the exploitation pattern among years need to be better defined
- * Discard rates due to sorting machines should be estimated
- * Movement rates of butterfish into deeper waters and to non-fishing areas should be determined
- * Evaluations of changes in M with age need to be conducted
- * Re-examination of 1968-1975 catch at age and survey catches at age is necessary given variation in age length keys on an annual basis
- * Better resource predictions based on survey data may be possible
- * Stock-recruitment relationships should be evaluated in more detail
- * Improved calculations of growth rates are necessary
- * Increased sea sampling activity on butterfish trips would better current discard practices and rates

Loligo Squid

- * Improved CPUE indices should be developed and related to NEFC surveys
- * Estimates of survey catchability coefficients are necessary for area swept population estimates

Illex Squid

- * Stock structure and recruitment mechanisms are unresolved and require more basic research
- * Improved abundance indices are necessary
- * NEFC surveys cover only a portion of the total stock range both by latitude and depth

American Lobster

- * Better estimates of growth (including molting periodicity and

probabilities) are needed for improved modeling studies

- * Length-based cohort studies are currently underway
- * Effort standardization among fisheries is a difficult problem but necessary for CPUE assessments
- * Discard rates/mortalities are poorly understood
- * Time series modeling approaches for lobster have good predictive ability; lobster analyses may be a useful model for extending T-S approaches to other species

Red Crab

- * Adequate assessment data currently exist and are being archived. However, these data cannot be released since CPUE data are confidential

Northern Shrimp

- * Factors affecting variability in the hermaphroditic life cycle are poorly understood
- * Improved estimates of M are required, as are more refined estimates all biological parameters
- * Relative temperature-F influences on stock size are unresolved
- * By-catch of finfish in shrimp fisheries may be problematic

Surf Clam

- * Integration of ageing data into assessments is a priority
- * Bioeconomic modeling studies may become important
- * Preliminary VPA analyses may be feasible when commercial age composition data are available
- * CPUE trends are confounded by changes in the management program

but trends are generally consistent with stock size changes as measured by NEFC surveys

- * Density dependent growth changes should be more fully integrated into Yield per recruit approaches for assessing optimum age (size) at entry
- * Factors controlling recruitment are poorly understood but important for management in the long term

- * Calculation of transformed abundance indices should reduce recent inter-survey variability

Sea Scallop

- * Increases in fishing power coefficients are difficult to estimate
- * Biological sampling from the fishery may be biased for larger scallops, perhaps direct meat sampling in the ports would be more reliable
- * If U.S. and Canadian surveys of Georges Bank resources are redundant then some economies may be realized by cooperative approaches
- * Bioeconomic modeling studies for scallops may be important
- * More studies of the relative performance of survey gear over various bottom types are required

APPENDIX III

GENERAL ASSESSMENT ISSUES

- * Many of the demersal resources were the objects of intensive directed fisheries when the stocks were abundant, but have been taken more incidentally as stocks have declined. This leads to difficulties in interpretation of CPUE (the magnitude of the declines may actually be underestimated). A generic mixed-species approach to effort and CPUE analyses would likely resolve these discrepancies and allow for evaluations of the overall trends in fishing effort over time.
- * Several issues related to catch sampling in the ports were raised during the workshop, including the prioritization of sampling by species within individual ports, and the general consistency of market category designations by season, port, and resource abundance. These issues are important not only for biological monitoring, but for economic studies as well.
- * The utility of recreational fishery surveys for stock assessment purposes was questioned for several species. Workshop participants considered several alternatives for augmenting the recreational surveys within the individual states. These issues will be explored in more detail at the Northeast Statistical Technical Committee meeting during 23-24 July.
- * The workshop participants considered other species that are not currently assessed formally by NEFC. Species considered important enough to warrant increased attention included weakfish, spot, croaker, windowpane flounder, sand lance, and pelagic sharks. Currently, weakfish, spot and croaker are considered by ASMFC in the Sciaenid Board, a management plan for pelagic sharks is currently being planned, sand lance are of considerable ecological interest, and windowpane have recently become more important to New England fishermen as other flounder resources have declined.
- * Workshop participants considered the most appropriate assessment forums for each species currently assessed, based on state/federal interest in the species, where particular expertise lies, and based on the adequacy and availability of assessment data. Those species that are to be assessed by NEFC were assigned to either a spring or autumn semi-annual assessment meeting. These assignments were based on the needs of management bodies, and the availability of appropriate data.

- * During many of the species overviews it was emphasized that research on stock identification was a major consideration. Several state participants indicated that stock identification was their major research priority. Given the importance of these studies for a number of species, the participants discussed several generic approaches to stock identification, including tagging studies, biochemical analyses, meristic and morphometric evaluations, parasite/disease frequencies, and scale imagery. In general, more coordination in the collection of samples for stock identification is needed in order to better characterize the distribution of stocks over their entire range. Academic institutions are particularly well suited to conducting the laboratory analyses of samples, but may not have the ability to collect comprehensive samples in the field. Thus, if these studies are to be meaningful, coordination among the states and, where appropriate, the federal labs in terms of sample collection and overall analysis seems appropriate.
- * Workshop participants also considered the appropriateness of more directed research into the nature of stock/recruitment relationships, since many stocks seem to be exhibiting signs of recruitment overfishing.